

Questions

1. Select the four characteristics of the link between the components identified for each technical object shown below.

a) Bookshelf



Shelf and side panel
Note: the shelves are glued in place

Direct or Indirect

Complete or Partial

Removable or Permanent

Rigid or Flexible

b)



Light bulb and socket

Direct or Indirect

Complete or Partial

Removable or Permanent

Rigid or Flexible

c) Clothespin



Two prongs

Direct or Indirect

Complete or Partial

Removable or Permanent

Rigid or Flexible

2.

A washing machine contains many parts that may break down over time. What would be the best system to attach the back cover to the body of the washing machine to permit access for repairs.

A) rivet

B) glue (adhesive)

C) screw

D) nail

3.

A small screw is usually used to link the arm of a pair of glasses to the frame. Explain why this is a good choice by referring to the characteristics of the link.

4. State the main type of guiding control for each item below.

a) Peanut Butter Jar



b) Window



c) File Cabinet Drawer



d) Door Handle



e) C-clamp



f) Laptop



5. A cam and follower system transforms the rotational motion of a cam into the reciprocating translational motion of a follower. Which cam below would not allow for both clockwise and counter-clockwise motion?

A)



B)



C)



D)



6. A student wishes to build a pull toy of a clown sitting in a cart in which a mechanism will cause the hat of the clown to move up and down as the cart is pulled.

Which one of the systems below would not be suitable for a mechanism in this toy?

A) Crank and slide

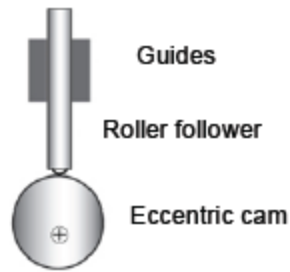
B) Cam and follower

C) Rack and pinion

D) Crank, connecting rod, and slide

Examine the cam and follower system illustrated below.

7.



Describe two ways the rise of the follower could be increased.

8.

Which of the systems below could produce a change in speed similar to the one in a wheel and worm gear system?

A) Two pulleys of equal size connected by a belt



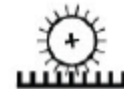
B) A large driver gear turns a smaller driven (receptor) gear



C) A small driver gear turns a middle size intermediary gear which turns a large driven (receptor) gear



D) A rack and pinion system where the pinion is the driver and the rack is the driven (receptor).



9.

The following image is an example of what type of constraint?



A) Compression

B) Torsion

C) Deflection

D) Tension

10.

The following image is an example of what type of constraint?



A) Compression

B) Torsion

C) Deflection

D) Tension

11.

Hockey sticks are made from a material that can resist indentation and shock when coming into contact with a puck or the ice. The material also has to be lightweight to be easily handled by the player. Here is a list of possible materials to choose from:

Materials	Properties
Steel	Hardness Resilience Ductility High density High thermal conductivity
Carbon fibre	Low density Hardness Resilience Electrical conductivity Resistant to corrosion Rigidity
Polymethyl (acrylic)	Hardness Rigidity Comes in a variety of colours Malleability Brittleness
Polyamide (nylon)	Resilient Medium hardness Flexible High moisture absorbance

Which of the materials above would be the best material to use for a hockey stick? Explain your choice by using the properties of the materials.

1.
 - a) *Indirect, complete, permanent, rigid*
 - b) *Direct, complete, removable, rigid*
 - c) *Indirect, partial, removable, flexible*
2. C
3. *The screw creates a link that is removable, indirect, so the arm can be replaced. The link is partial to permit movement.*
4.
 - a) *helical*
 - b) *translational*
 - c) *translational*
 - d) *rotational*
 - e) *helical*
 - f) *rotational*
5. D
6. B
7. Use a larger cam or lower the center of rotation.
8. C
9. C
10. B
11. *The best material would be carbon fibre because:
Low density: light weight
Hardness and resilience: resistance to denting and shocks
Resistance to corrosion: subjected to ice and water
Rigidity: resistance to application of constraints.*

